

ARISE - Advanced Radio Interferometry between Space and Earth

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We are studying an affordable second-generation space Very Long Baseline Interferometry (VLBI) mission concept named ARISE (Advanced Radio Interferometry between Space and Earth), based on one or more inflatable space radio telescopes. The orbiting telescope(s) would operate with high efficiency at frequencies between 5 and 43 GHz, and also (perhaps with lower efficiency) at 60 and 86 GHz. The primary science goals include the following: (1) measurement of the properties of active galactic nuclei closer to their central engines than is possible with any other technique; (2) direct determination of the extragalactic distance scale out to 50–200 Mpc, using proper motions of water masers in external galaxies; and (3) measurement of the distribution of temperature and molecular oxygen abundance in dozens of interstellar clouds within our Galaxy. Achievement of these goals would be enabled by increased high-frequency coverage (up to 86 GHz) and improved interferometer sensitivity (by a factor of 50–200 at 5 and 22 GHz) compared to the first-generation VLBI Space Observatory Programme (VSOP) mission.

Two important milestones will occur in 1996. In May, a 14-m inflatable antenna surface will be flown from the Space Shuttle, to prove deployment and to compare its surface accuracy to ground measurements, as part of the In-Space Technology Experiments Program. This experiment will demonstrate the antenna technology required for ARISE. In September, the first dedicated space VLBI spacecraft, VSOP, will be launched from Kagoshima, Japan. VSOP is expected to provide interesting scientific results that will preview the exciting science possible with the much more capable ARISE mission.

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